

The
**WIRELESS
WORLD**



**"ANTI-SULPHURIC" ENAMEL
RESISTS ACID FUMES, Etc.**

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“W/T. R.E.”

An Account of the Work and Development of Field Wireless Sets with the Armies in France.

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(Continued from October Number.)

I HAVE already briefly described the power buzzer, the “loop” set and the B.F. set. The first was an ingenious adaption of the early experiments in “wireless” conduction through the earth, the last-named a compact 50-watt spark set using an induction-coil with magnetic make-and-break. The loop set, specially designed for forward trench work or open fighting, presents many points of interest. Transmission is carried out on a “closed” circuit, the inductance from which energy is radiated being a square frame-work of brass tubing about a metre inside.

For effective radiation the wavelength used must be small, power being limited by the weight of the accumulator carried. The set is made for wavelengths of 65 or 80 metres, the brass loop fitting on to a small ebonite box containing spark-gap and condenser, which in turn clips on to a bayonet stuck into the ground, while a rubber lead enables the operator to manipulate his key and have induction-coil and accumulator under shelter some twenty feet away. The receiving apparatus comprises a two-valve circuit of a most ingenious type and ground aerials only seven yards long. Though the power of the set is only twenty watts, it is capable of signalling over from two to five miles, while the forward transmitting loop can be completely screened from enemy observation by being placed in a trench or dug-out, without much weakening of signal strength.

A technical description of the types of continuous wave sets used is beyond the scope of this article. The circuits employed have in some cases already been described in *THE WIRELESS WORLD* by other writers.

One or two valves were used for transmission, high tension for the plate circuit being supplied either by small primary cells, special types of induction coil (tonic train), or small rotary converters with or without rectifying devices.

While the sets for forward use were small and designed for simplicity and portability, other more complicated sets were fitted up in cars and lorries for special work behind the lines.

Masts and aerials varied in type and height according to the set used, and its proximity to the enemy. The usual spark trench set mast was fifteen feet high and made up of small tubular steel sections, while the aerial varied in length from 50 to 100 yards. Usually when shelling was particularly bad a number of aerials were erected, led in at different points to the dug-out used as station, so that if one was cut another could be employed. In the case of C.W. sets a very short and low aerial was possible, sometimes measuring no more than ten yards long and four feet high, and supported on tripod masts or any convenient ruin to hand. The directional property of the L type aerial was found to be very strong, even with short-range sets, and of course especially so in the case of low or ground aerials.

As a rule the aerial was led into the dug-out which housed the set, by means of thick rubber-insulated cable, though the damp walls of the shafts and stairways often gave trouble, especially with continuous wave sets. For earth connection a copper gauze mat was used, buried or simply laid out on the ground if the station had to be very mobile.

It is easily seen that messages sent by wireless, unless extremely urgent, could not be sent in “clear.” The Germans, like ourselves, had special arrangements for intercepting wireless messages and special facilities for letting the fighting troops take advantage of anything learnt from our messages. So that, unless delay was dangerous, our messages were enciphered before being sent. So adept did our operators become that unless the message was a long one, the loss of time in this way was small. For messages which could not wait, the endorsement “To be sent by wireless in Clear” was all that was required. Cipher messages were always sent twice to ensure correct reception.

The daily routine of the operator in trench warfare when no fighting was going on was mainly concerned with the fetching and carrying of rations and accumulators, and the disposal of a few practice messages each day, as well as keeping a continuous watch by day and by night, in case of sudden attack. Of his work when a battle started, the moving and carrying forward of his station, erecting masts and aerials, “getting through,” sending and receiving messages all in the dust and din of the fighting with shells breaking his aerial every few minutes—of this an epic could be written, but he himself would merely glance at the medal he wore, and say nothing.

The necessity for keeping strict control and continuous watch over our sets in the line was due to the fact that the

Germans possessed a very complete system of intercepting stations, with a staff of expert deciphers. The latter were ready to pounce on any message where the operator had made a blunder, hence the reason for strict control of our traffic. German army headquarters kept a tame mathematical Herr Professor for deciphering our messages, according to captured German wireless operators. The Herr Professor apparently hardly earned his pay to judge by the secrecy maintained in our heavy traffic during battles.

On our own side we were well organised for obtaining important information from the distribution of enemy wireless sets as well as for decoding their messages. For the former we employed special position-finding (P.F.) stations. The usual name “D.F.” would be more accurate, for in each of our five armies we had a number of such stations all connected by telegraph and telephone to a central headquarters where the bearings made by our stations on enemy sets were plotted, and the positions of the latter found within a few hundred yards.

The *interception* of enemy messages was also an important part of the work of these “Wireless Observation Groups” as they were called. For although the Boche used a difficult code for his messages, a code changed every few weeks, we too had our decoders, and very able ones. The weekly acrostic in the *Sunday Times* was a good preparation for wrestling with German messages and many of our code experts were recruited from the ranks of the acrostic-solvers! Sometimes, too, the methodical German made a slip and by sending a message first in code and then in “clear” or something similar, made us a present of his efforts in encoding any further messages.

Yet another portion of an Army

Wireless Observation Group was devoted to the rapid location of any enemy aeroplanes observing for their artillery. From the moment the poor Boche tried his wireless over the aerodrome he was kept under wireless observation and before he had properly begun registering the "shoot" a special R.A.F. squadron had been telephoned to and a 'plane was on its way to interrupt the proceedings. Great success was obtained by these aeroplane P.F.'s., and while numerous "shoots" were stopped, sometimes a dozen enemy 'planes would be shot down in a week owing to the information as to position given in this way.

Of the instruments and apparatus used in our later P.F.'s. it will suffice to say that with the advent of the hard valve it was found possible to effect many changes and improvements on the

original Bellini-Tosi aerial system and the circuits used. The big amplification obtainable nowadays made it an easy matter to reduce the size of the triangular aerials, and in fact to make the direction-finding depend not on the balancing of a radiogoniometer but on the actual rotation of a triangular loop aerial. All this made for simplicity and lightness, important factors in military work.

The development of these cunning wireless intelligence devices made both sides become more and more cautious as time went on. Camouflage and counter-camouflage in 1918 made things very interesting. Wireless sets were concentrated in areas where no attack was contemplated, and sets in areas where attacks were preparing, were kept normal. Many were the devices employed to cover up weaker points in our



An Army H.Q. Telegraph Station.

line by using extra sets at dummy headquarters and by moving existing sets from one spot to another. Every weak point in our system was watched, and utilised to delude the trusting Hun on P.F. or intercepting set.

Of German spies with wireless sets spotted by our P.F.'s., of others with receiving sets found in other ways, of weary journeys in motors in search of wireless spies—which sometimes ended in the discovery of a misguided British wireless operator in the back-areas (after one had crept dramatically up, revolver in hand)—much could be written. But I cannot close this narrative without a reference to the "I.T.'s." or listening sets, which though not strictly "wireless" sets were yet so important a part of the wireless sections work.

The "I.T.", so called apparently because it was a "hush-hush" apparatus simply consisted of a special three-valve amplifier placed in a dug-out close to the front line and used to pick up enemy telephone, buzzer and power-buzzer messages by means of earth-pins inserted in the ground at points as near as possible to the German trenches. These pins were placed in No Man's Land at night and cable leads led back from them to the dug-out containing the amplifier. The Germans, like ourselves, used telephones freely at one time in their front-line system, and owing to leakage from the telephone cables, either actual or by induction, it was possible to hear German officers talking sometimes louder than they could hear themselves. In this most important department of intelligence the Germans were first in the field, hence their almost uncanny knowledge of such things as infantry reliefs. Our first listening sets were in use in the spring of 1916 and grew in number as their value was realised. They were man-

ned by German-speaking operators attached to wireless sections and their installation and up-keep devolved upon corps wireless sections. The information gained by them was most important, comprising conversations giving away the strength of the units holding the trenches, times and dates of reliefs, projected raids, mine-explosions and attacks, as well as the names of divisions, brigades and battalions in the line. I can only give one example from a host of cases where the "I.T.'s." information saved the lives of numbers of our men or caused German plans to fail. On September 7th, 1917, the interception of German messages by one of our listening sets enabled warning of a hostile raid to be given some time before it was launched. The attack at 5.30 a.m. was completely repulsed. The following were the points noticed which led us to take successful counter-measures:—

- (1) Unusual amount of conversation over the telephone from 8 p.m. onwards.
- (2) A speaker appeared to be very anxious that everyone should be on the alert. This was reported to our battalion H.Q. at 10.20 p.m.
- (3) Time signals for synchronisation of watches were interchanged at 4.41 a.m.

Here is another case—December 5th, 1916. "Hullo, who is there?"——

"Berlinerhaus here, what do you want?"——

"What, a mine to-night?"——

"Well, good health."

The conversation was faint, but our listening set warned Brigade H.Q., and the mine went up late that night.